

CLAIMS

What is claimed is:

1. A manufacturing method of a fluid jetting apparatus, comprising:
forming a heat driving part, a membrane, and a nozzle part; and
forming a nozzle and jetting fluid chambers sequentially by using one nozzle plate, and
assembling the heat driving part, the membrane, and the nozzle part, sequentially.

2. The manufacturing method as claimed in claim 1, wherein the forming of the
nozzle comprises:

laminating the nozzle plate on a substrate;
forming the nozzle in the nozzle plate; and
forming the jetting fluid chambers by extending the nozzle in a direction.

3. The manufacturing method as claimed in claim 2, further comprising separating
the nozzle plate from the substrate.

4. The manufacturing method as claimed in claim 2, wherein the nozzle plate is
adhered to the substrate through the laminating of the nozzle plate on the substrate, the
manufacturing method further comprising abrading the nozzle plate to have a predetermined
thickness before the forming of the nozzle in the nozzle plate.

5. The manufacturing method as claimed in claim 4, wherein the abrading of the
nozzle plate comprises chemo-mechanical polishing the nozzle plate to have the predetermined
thickness.

6. The manufacturing method as claimed in claim 2, wherein the nozzle plate is
made of silicon.

1 7. The manufacturing method as claimed in claim 2, wherein the forming of the
2 nozzle and the jetting fluid chamber are performed through a lithography, respectively.

1 8. The manufacturing method as claimed in claim 2, wherein the forming of the
2 jetting fluid chamber comprises performing an anisotropic etching of the lithography.

1 9. The manufacturing method as claimed in claim 3, further comprising separating
2 the nozzle plate and the substrate after assembling the heat driving part, the membrane, and the
3 nozzle part sequentially.

1 10. The manufacturing method as claimed in claim 1, wherein the forming of the
2 nozzle and jetting fluid chambers are performed prior to assembling the nozzle part to the
3 membrane.

1 11. The manufacturing method as claimed in claim 1, wherein the assembling of the
2 nozzle part to the membrane comprises using an adhesive or an anodic bonding to fix the
3 nozzle part to the membrane.

1 12. The manufacturing method as claimed in claim 2, wherein the laminating of the
2 nozzle plate on the substrate comprises:

3 forming an insulated layer on the substrate; and

4 using an adhesive or an anodic bonding to fix the nozzle plate to the insulated layer.

1 13. A manufacturing method of a fluid jetting apparatus, comprising [the steps of]:
2 forming a heat driving part, a membrane, and a nozzle part; and
3 assembling the heat driving part, the membrane, the nozzle part, sequentially, the step
4 assembling of the heat driving part, the membrane, and the nozzle part comprising:
5 laminating a nozzle plate of silicon on a substrate,

6 abrading the nozzle plate to have a predetermined thickness by a chemo-
7 mechanical polishing,
8 forming a nozzle through a lithography,
9 forming a jetting fluid chamber on an area where the nozzle is formed by an
10 anisotropic etching of the lithography, and
11 separating the nozzle plate from the substrate.

1 14. The manufacturing method as claimed in claim 10, wherein the forming of the
2 nozzle and the jetting fluid chambers further comprises assembling the nozzle plate to the
3 membrane subsequent to the forming of the jetting fluid chamber and prior to the separating of
4 the nozzle plate from the substrate.

1 15. A method of manufacturing a fluid jetting apparatus, comprising:
2 forming a nozzle and jetting fluid chambers in a single piece nozzle plate; and
3 attaching the nozzle plate with the nozzle and jetting fluid chambers formed therein to a
4 membrane of a membrane-heat driving part assembly.

1 16. The method as claimed in claim 15, wherein the forming of the nozzle and
2 jetting fluid chambers comprises:
3 forming the nozzle in the nozzle plate; and
4 forming the jetting fluid chambers by extending the nozzle in a depth direction.

1 17. The method as claimed in claim 16, wherein the forming of the nozzle and
2 jetting fluid chambers comprises attaching the nozzle plate to a substrate prior to forming the
3 nozzle on the nozzle plate.

1 18. The method as claimed in claim 17, further comprising:
2 separating the nozzle plate from the substrate subsequent to the attaching of the nozzle
3 plate to the membrane.

1 19. The method as claimed in claim 17, further comprising abrading the nozzle
2 plate to a predetermined thickness subsequent to attaching the nozzle plate to the substrate and
3 prior to forming the nozzle on the nozzle plate.

1 20. The method as claimed in claim 16, wherein:
2 the forming of the nozzle is performed by lithography; and
3 the forming of the jetting fluid chambers is performed by an anisotropic etching in a
4 vertical direction of the nozzle plate, to etch a surface of the nozzle plate to a uniform depth
5 and simultaneously fully form the nozzle.

1 21. A method of manufacturing a fluid jetting apparatus, comprising:
2 attaching a nozzle plate to a first substrate and forming a nozzle and jetting fluid
3 chambers in the nozzle plate attached to the first substrate; and
4 attaching the nozzle plate attached to the first substrate to a membrane attached to a
5 heat driving part which is attached to a second substrate; and
6 removing the first substrate from the nozzle plate subsequent to the attaching of the
7 nozzle plate to the membrane.

1 22. The method as claimed in claim 21, wherein the membrane attached to the heat
2 driving part which is attached to the second substrate is formed by a method of:
3 attaching the heat driving part to the second substrate; and
4 attaching the membrane to the heat driving part attached to the second substrate.

1 23. The method as claimed in claim 21, wherein the forming of the nozzle and the
2 jetting fluid chambers in the nozzle plate comprises:
3 forming the nozzle in the nozzle plate; and
4 forming the jetting fluid chambers by extending the nozzle in a depth direction.

1 24. The method as claimed in claim 23, wherein the nozzle plate is a single piece of
2 silicon.

1 25. The method as claimed in claim 23, further comprising abrading the nozzle
2 plate prior to forming the nozzle in the nozzle plate.

1 26. The method as claimed in claim 23, wherein the forming of the nozzle and the
2 forming of the jetting fluid chambers are performed through a lithography.